

mutually communicating, using passage means, spaces  
separated by the optical components, for assisting in gas  
purgings by the gas purging means,  
wherein a straight line connecting adjacent passage  
means provided in the same casing for gas purging, is not  
parallel to an optical axis the at least one lens.--.

REMARKS

Applicant requests favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

To place the subject application in better form, the specification has been amended to correct minor informalities. Also, a new Abstract is presented in accordance with preferred practice. In addition, a new Title is presented in accordance with the Examiner's request. No new matter has been added by these changes.

Claims 1 through 7, 9 through 12 and 14 through 18 are presented for consideration. Claims 1, 6, 9 and 14 through 18 are independent.

To expedite prosecution, claims 1, 2, 5, 6 and 9 through 12 have been amended, while claims 8 and 13 have been cancelled without prejudice or disclaimer. Also, claims 14 through 18 have been added to recite additional features of the subject invention. Support for these changes can be

found in the original disclosure, as filed. Therefore, no new matter has been added.

Applicant notes with appreciation that claim 9 would be allowable if rewritten in independent form. To advance prosecution, claim 9 has been so rewritten. Therefore, Applicant submits that claim 9 should be deemed allowable. In addition to claim 9 being allowable, Applicant submits that the remaining claims patentably define features of the subject invention.

Applicant requests favorable reconsideration and withdrawal of the objection and rejections set forth in the above-noted Office Action.

Claim 13 was objected to on formal grounds. To expedite prosecution, claim 13 has been cancelled without prejudice or disclaimer.

Claims 1, 10 and 13 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. The Examiner objected to specific recitations in these claims. The Examiner's comments were taken into consideration when amending claims 1 and 10.

The Examiner's objection to the term "substantially" in claim 1, however, is traversed. Applicant submits that this term would be readily understood by one having ordinary skill in the art, when read in light of the subject disclosure, particularly the description on page 7 at line 23 to page 8, line 7, for example.

Ideally, the humidity in the ambience of an optical path should be reduced completely to zero. To do so, however, would require complicated structures and would be very expensive. On the other hand, the presence of a gas having a very low humidity, such as a humidity level that does not cause an apparent change in spectral reflection characteristic or in an absorption coefficient on any of the optical surfaces, depending on the type of light source used, or a humidity with which the spectral reflection characteristic or absorption factor of any of the optical surfaces can be disregarded, depending upon the product specifications, for example, can be accepted in practice. Simply put, therefore, a gas having substantially no water content is acceptable - practically speaking. In consideration of the foregoing, Applicant has amended independent claim 1 to refer to a gas having substantially no water content.

Applicant further submits that the subject matter of claim 10 is supported by the original disclosure, at least on page 14 at line 16 to page 15, line 6, for example. Applicant has amended claim 10 to clarify that a straight line (i.e., a virtual line) connecting adjacent gas-purging passageways is not parallel to the optical axis.

In view of the foregoing, Applicant submits that the rejection under 35 U.S.C. § 112, second paragraph, has been overcome. Such favorable indication is requested.

Turning now to the art rejections, claims 1 through 3 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 4,786,947 to Kosugi, et al. Claims 1, 4 through 8 and 10 through 12 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 5,696,623 to Fujie, et al. Applicant submits that the cited art does not teach many features of the present invention, as previously recited in claims 1 through 8 and 10 through 13. Therefore, these rejections are respectfully traversed.

Independent claims 1 and 6 recite various aspects of an exposure apparatus. The exposure apparatus includes, among other features, an illumination optical system for illuminating an original with ultraviolet light, a projection optical system for projecting a pattern of the original onto a substrate to be exposed and gas purging means.

As recited in independent claim 1, the gas purging means replaces an inside space, which contains optical components of at least one of the illumination optical system and the projection optical system, with a gas having substantially no water content.

As recited in independent claim 6, the gas purging means replaces an inside space, which contains optical components of at least one of the illumination optical system and the projection optical system, with a particular gas, the optical components comprising at least one lens. The exposure apparatus recited in independent claim 6 further

includes passage means, mutually communicating spaces separated by the optical components, for assisting in gas purging by the gas purging means and a support for supporting the at least one lens. The passage means comprises an aperture formed in the support.

Applicant submits that the cited art does not teach such features of the present invention, as recited in independent claims 1 and 6.

The Kosugi, et al. patent relates to a projection exposure apparatus and shows the use of a housing for accommodating an optical system and isolating the same from outside air, as well as using a humidity sensor. That patent further shows a purging device for directly controlling the temperature or pressure of the inside gas, which is circulated inside the casing.

The Kosugi, et al. patent, however, is silent with respect to supplying a gas containing substantially no water content into an inside space where the optical system is placed. In this regard, the humidity sensor disclosed in the Kosugi, et al. patent merely monitors a change in humidity inside the housing that accommodates the optical system, exclusively to correct the focus position, distortion or magnification of the optical system. Therefore, the Kosugi, et al. patent does not teach or suggest salient features of the present invention recited in independent claims 1 and 6.

The Fujie, et al. patent relates to an ultraviolet exposure apparatus and shows the supply of gases into spaces containing lens elements. The Fujie, et al. patent, however, as with the Kosugi, et al. patent does not teach or suggest replacing an inside space, which contains optical components, with a gas having substantially no water content, as in the present invention recited in independent claim 1.

Still further, the Fujie, et al. patent teaches separating spaces by lens elements, with gases being supplied into and discharged out of these spaces individually. Nevertheless, there is no gas purging passageway for communicating these spaces, as in the present invention recited in independent claim 6.

Still further, the device in the Fujie, et al. patent is in direct contrast to the present invention recited in independent claim 6. As recited in that claim, the gas purging means for communicating adjacent spaces is provided at a support portion of the optical element. In contrast, the Fujie, et al. patent shows the use of bores Ha through Hd. These bores, however, are provided to communicate the spaces of the lenses with the outside pipes Pin and Pout, individually. These bores do not function to supply a gas to adjacent spaces, as does the gas purging means of the present invention recited in independent claim 6.

For the foregoing reasons, Applicant submits that the present invention, as recited in independent claims 1 and

6, is patentably defined over the Kosugi, et al. patent or the Fujie, et al. patent.

Dependent claims 2 through 5, 7 and 10 through 12 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Further individual consideration of these dependent claims is requested.


For reasons similar to those advanced above, Applicant submits that claims 14 through 18 patentably define features of the exposure apparatus and the device manufacturing method of the present invention. In particular, the cited art is not read to teach or suggest at least the arrangement of the passage means of the present invention recited in independent claim 14, or the steps in the device manufacturing method of the present invention recited in independent claims 15 through 18. Therefore, those claims likewise should be deemed allowable over the cited art.

Applicant submits that the instant application is in condition for allowance. Favorable reconsideration, withdrawal of the objection and rejections set forth in the above-noted Office Action and an early Notice of Allowance are requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010.

All correspondence should be directed to our address listed below.

Respectfully submitted,

  
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